WHAT IS CLAIMED IS:

1. A projection optical system having an image side numerical aperture that is greater than or equal to 0.75, and which forms an image of a first object upon a second object using light of a predetermined wavelength less than or equal to 300nm, comprising:

plural optical groups having at least one lens; and

a distance D in nm along an optical axis between an optical surface closest to the second object, and the second object, satisfies a condition of $0.1 < D < 5$.

2. A projection optical system according to claim 1, wherein the image side numerical aperture is greater than or equal to 0.8.

3. A projection optical system according to claim 1, wherein a distance L in nm along the optical axis between the first object and the second object satisfies a condition of $800 < L < 1600$.

4. A projection optical system according to claim 1, wherein at least one of a plurality of optical surfaces of the projection optical system is formed in an aspherical shape.

5. A projection optical system according to claim 1, wherein the plural optical groups is four optical groups, and with T being a sum of thicknesses along the optical axis of all optical members included in the fourth optical group, and with D being the distance along the optical axis between the optical surface of the fourth optical group closest to the second object, and the second object, a condition of $0.001 < D/T < 0.2$ is satisfied.

6. A projection optical system according to claim 1, wherein the plural optical groups is four optical groups, and with T being a sum of thicknesses along the optical axis of all optical members included in the fourth optical group, and with L being a distance along

the optical axis between the first object and the second object, a condition of $0.02 < T/L$ is satisfied.

7. A projection optical system according to claim 1, wherein the plural optical groups is four optical groups, and a focal length F2 of the second optical group and a distance L in nm along the optical axis between the first object and the second object satisfy a condition of $0.01 < | F2 | /L < 0.15$.

8. An exposure apparatus comprising:

an illumination system for illuminating a mask as a first object;

a projection optical system according to claim 1, that forms an image of a pattern which is formed upon the mask upon a photosensitive substrate as the second object; and

a prevention device that prevents gas which is generated from the photosensitive substrate from adhering to the optical surface of the projection optical system that is closest to the second object.

9. An exposure apparatus according to claim 8, wherein the prevention device comprises a flow forming device that forms a predetermined flow of gas or liquid in an optical path between the optical surface closest to the second object and the photosensitive substrate.

10. An exposure method, comprising:

illuminating a mask as a first object; and

exposing, via a projection optical system according to claim 1, an image of a pattern which is formed upon the mask upon a photosensitive substrate as the second object, wherein

the exposing step comprises a flow formation process of forming a predetermined flow of gas or liquid in an optical path between the optical surface closest to the second object and the photosensitive substrate in order to prevent gas which is generated from the photosensitive substrate from adhering to the optical surface closest to the second object.

11. A method for manufacturing a microdevice, comprising:

exposing a pattern on a mask upon a photosensitive substrate, using an exposure method according to claim 10; and

developing the photosensitive substrate which has been exposed by the exposing step.